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URETHROSCOPY

an aid to

Diagnosis, Treatment and Prognosis

of

Urethral Conditions in the Male

due to

GONORRHOEA.

by

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I. THE ANATOMY AND HISTOLOGY OF THE URETHRA AND THE PATHOLOGY OF GONORRHOEA.

In order to make a correct diagnosis and to carry out a sound treatment of any disease it is essential to have an accurate knowledge of the anatomy of the organ affected and of the pathology of the disease affecting it.

THE ANATOMY OF THE MALE URETHRA.

It is merely necessary to bring out those points which will enable one to understand the effect of Gonorrhoea on the urethra, especially in longstanding cases.

The urethra is the channel by which urine passes from the bladder to the outside. Into this channel open the ejaculatory ducts and thus it acts also as a passage for the spermatic fluid.

In its course from the neck of the bladder to the root of the penis the urethra describes a curve, the concavity of which looks upwards and forwards. Anterior to this it bends down and runs along the under surface of the penis. These two curves together form a rough S, the posterior one of which is alone permanent, /

permanent, the other disappears when the penis is raised, e.g. the position required for the introducing of a sound.

The posterior part of the urethra - about 1 inch - is surrounded by the prostatic gland. Anterior to this it is free and pierces the middle aponeurosis of the perineum, and passes forward between the two columns of the corpus spongiosum, which form a protecting sheath for it as far as its termination in the glans penis.

The urethra can thus be divided into three parts, the prostatic, the membranous and the spongy portion.

For Clinical and Pathological purposes only two parts are differentiated, - the anterior urethra which extends from the meatus to the triangular ligament of the perineum, and the posterior urethra which includes the membranous and prostatic portions.

These two parts of the canal are separated or cut off from one another by the membranous sphincter, which forms a barrier to the passage of any secretions from the anterior to the posterior urethra, or vice versa.

Thus a liquid passed under moderate pressure into the anterior urethra will not travel beyond the membranous sphincter and it requires considerable pressure/

pressure to force a fluid past this point.

Secretions in the posterior urethra tend to regurgitate into the bladder and those in front of the membranous sphincter flow out of the urethra through the meatus.

The lumen of the urethra varies at different points.

The meatus is the external opening of the urethra and is formed by two lateral lips joined together by two commissures, - anterior and posterior.

The meatus is usually directed forwards but there are conditions when it is on the under surface of the glans and then it looks backwards. There are cases in which there appear to be several openings, but it is the posterior one which is the true urethral opening, the anterior one forms a blind pocket or para urethral duct - a common source of trouble in prolonging an attack of gonorrhoea if not recognised and dealt with.

The lumen of the urethra is narrowest at the meatus and it is at this point that it is most difficult to dilate it. This fact sometimes makes it necessary to split or cut the meatus in order that a sound of the required calibre may be passed.

The calibre of the meatus is usually anything between 24 and 26 Charriere. It is seldom below 20 or above 32.

Immediately/

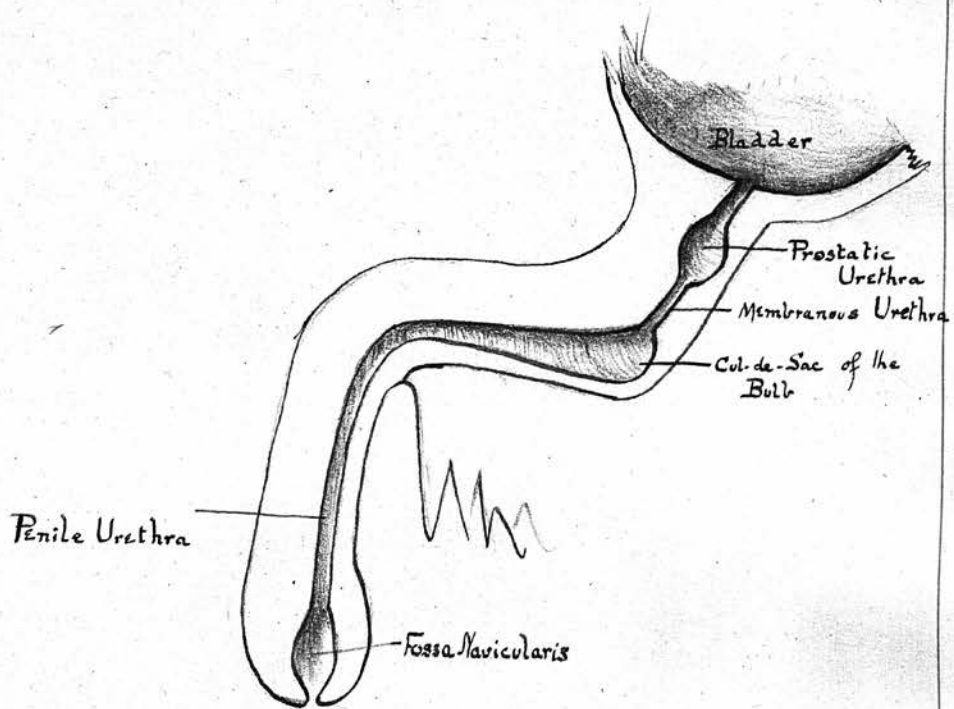


Diagram of the Lumen of the Urethra.

Immediately internal to the meatus the lumen of the urethra widens to form the fossa navicularis which is about an inch long, and is limited behind by the neck or valve of the fossa navicularis. I have known a few instances where this neck was narrower than the meatus, but as a rule anything which can be passed through the latter can easily be passed through the neck of the fossa navicularis.

The spongy portion of the urethra is continued further into the cavernous part which is of a uniform calibre throughout, varying from 30 - 35 charriere. It ends in a fusiform enlargement, the bulb which has an extensile calibre of 40 - 45 Charriere.

At the anterior part of the inner end of the bulb lies the membranous sphincter leading into the membranous urethra. I find it helpful to remember this fact, for in passing sounds where there is any difficulty in entering the posterior urethra, it may often be quite easy by gently raising the sound and thus coming opposite the sphinctral opening instead of pushing against the blind end of the bulb - a common site of injury due to the passing of instruments.

This can be easily understood by reference to the corresponding diagram showing the various parts of the urethra. The membranous portion of the urethra is cylindrical and is practically uniform throughout./

throughout.

Internal to this the urethra again widens out into a fusiform enlargement, and on the floor of this portion is found the verumontanum. The urethra then becomes narrower again to correspond with the internal sphincter at the neck of the bladder.

To resume:- The lumen of the urethra presents four narrow points and 4 or 5 potential spaces.

- (1) the meatus (2) the neck of fossa navicularis
- (3) membranous sphincter.
- (4) vesical or internal sphincter.

(1) Fossa navicularis. 2 Cavernous portion.

(3) Bulb. (4) membranous urethra

(5) Prostatic urethra.

Length 10 inches long.

Prostatic $\frac{3}{4}$ inch

Membranous $\frac{1}{2}$ inch

Anterior Urethra $8\frac{3}{4}$ inches.

Relations:-

1. Spongy Urethra.

The spongy urethra lies between the columns of the corpus spongiosum from which it derives its name. The corpus spongiosum consists of erectile tissue formed in two columns, the corpora cavernosa. At the posterior end these fuse to form a bulb, and anteriorly they expand into and are continuous with the glans penis./

penis.

The spongy portion of the urethra is the longest part of the urethra and may be divided into a perineal, scrotal, penile and balanic part for descriptive purposes.

The perineal-scrotal part is related laterally to the ischiopubic arches covered by the corpus cavernosa and corresponding ischio-cavernosus muscle of each side, accompanied by the secretory ducts of Cowper's Glands which enter the bulbous portion on its under surface.

Inferiorly the spongy urethra is covered by skin superficial fascia of the perineum and the sheath of the Corpus spongiosum and the bulbo-cavernosus muscle.

The penile part lies along the under surface of the penis. It is covered with skin subcutaneous tissue, superficial fascia and the sheath of the Corpus cavernosum.

2. The Membranous Urethra.

This portion of the urethra passes through the middle of the perineal aponeurosis which is adherent to its walls and thus fixes them. Anteriorly is the symphysis pubis, posteriorly is the rectum, above it is continuous with the prostatic portion, and below with the bulbous portion of the urethra. The membranous urethra is fairly near the surface and is separated from/

from the skin of the perineum by no important structures and this fact makes it easy of access for external urethrotomy.

3. The Prostatic Urethra.

The prostatic urethra begins at the neck of the bladder and passes forwards through the anterior part of the prostate gland.

Its relations anteriorly are the venous plexus of Santorini and the symphysis pubis; posteriorly are the prostate and the rectum, and on each side is the levator ani muscle with its fascia.

Internal Structure of the Urethra.

This is different in each of the named divisions of the urethra.

1. The Spongy Urethra:-

In the Spongy urethra there are

(1) The Lacunae of Morgagni.

These are arranged in a row down the centre of the anterior wall. They consist of a valve and pouch. One large one is fairly constant and can be seen close to the neck of the fossa navicularis. It is called Guerin's valve.

These pouches are not true glands but are simple invaginations of the mucosa.

(2)/

(2) Littre's Glands.

Other small openings may be seen by the help of a magnifying glass - the mouths of Littre's glands. These are placed laterally in more or less longitudinal rows.

Both the lacunae of Morgagni and Littre's glands form a very important part in prolonging an attack of Gonorrhoea.

During an attack a lacuna or a group of Littre's glands becomes infected and the inflammation set up around them leads to their obstruction. When the mouths of these glands are thus closed, Gonococci within them are shut off and form a small cyst. Thus they form an excellent nest for the increase of gonococci, undisturbed by irrigations or injections which cannot reach them.

This cyst may lie dormant for a long time or burst and discharge part of its contents into the urethra. In this way the inflammatory attack may be renewed and much disappointment experienced.

HISTOLOGY OF THE URETHRA.

The walls of the urethra consist of three coats:-

- (1) the muscular or outer coat
- (2) the vascular or middle
- (3) the mucous or inner.

(1) The Muscular Coat.

The muscular coat is formed by two layers of nonstriated muscle fibres. The fibres of the outer layer are arranged in a circular manner, those of the inner run longitudinally.

The circular layer is well developed in the posterior urethra, especially at the neck of the bladder where its fibres form the unstriated sphincter of the bladder. This ring of muscle keeps the bladder closed by its tonic contraction.

Besides the unstriated muscular fibres there are a number of muscles for voluntary contraction.- Guthrie's muscle, Wilson's muscle, the bulbo-cavernosus and the sphincter urethrae.

The longitudinal layer is the continuation of the plexiform layer of the bladder.

These are well marked posteriorly, but gradually become less and less along the anterior parts of the urethra.

Vascular/

2. Vascular Coat.

This is not well developed in the posterior urethra, where it is thin and marked by only a few vessels.

In the spongy region this layer is developed into a special organ - the Corpus spongiosum - which is formed by two columns within a strong sheath, which together form a bed for this part of the urethra.

These columns or corpora cavernosa consist of a net-work of venous spaces which freely anastomose with one another and participate in the phenomenon of erection.

3. Mucous Coat.

The urethra is entirely lined by a mucous membrane, which is very soft and thin and elastic. It may thus be easily damaged by a metal instrument, and one learns from experience that too great care cannot be shown in the manipulation of sounds, bougies, dilators, etc.

In the living subject the mucosa is of a pinkish red colour as seen by the urethroscope. Its smooth surface is gathered into a series of rugae and shows a uniform lustre all over.

Structure/

Structure of the Urethral Mucous Membrane.

It is composed of:-

- (1) An epithelial layer
- (2) A connective tissue layer
- (3) A system of glands.

1. The epithelial layer is made up of two rows of cylindrical cells and beneath these are regenerative cells - polygonal or ovoid in shape.

2. The connective tissue layer is made up of a stroma of tough laminar connective tissue cells interspersed with many elastic fibres.

These elastic fibres form a net-work which extends into the meshes of the erectile tissue of the vascular coat, and some project as far as the muscular coat, thus strengthening the mucosa and binding the different layers together.

3. The Glands.

The glands of the mucous membrane are of three types:-

- (1) Littre's glands
- (2) Cowper's glands
- (3) The prostate gland.

The/

The urethra is well supplied with glands which lubricate the lining surface with their various secretions, and thus protect it against irritation from the urine.

1. Littre's Glands.

The mouths of these glands may be seen on the surface of the mucous membrane if one examines this with a lens. When the glands are inflamed the lips are enlarged and may project, and are thus easily seen by means of the urethroscope. The glands project into the submucous or vascular coat.

They are composed of a thin membrane beneath which is a single layer of columnar epithelium. They secrete a clear, translucent mucous.

The ducts of these glands are directed obliquely towards the meatus, an important point in aiding one to cauterise them.

Inflammation of the mucous membrane or a plug of mucous may cause blockage of these ducts and thus a focus of infection is shut off and only discharges its purulent contents from time to time.

It is easily understood how a focus of this kind will reinfect the urethra and cause the purulent discharge to recur again and again, giving rise to great disappointment. This can be avoided so easily by early/

early and careful examination of the urethra and appropriate treatment of all the inflamed glands.

These glands actively secrete mucous during erection, and this fact to my mind explains the constant occurrence of a morning bead in chronic urethritis, in which only the glands of the urethra are inflamed, while all other parts of the urethra have regained their normal condition.

In such cases, when early treatment of the glands has usually been neglected, steady, patient, massage and dilatation of the urethra will slowly but surely diminish the morning gleet. This will ultimately disappear as the normal smoothness of the urethra is again restored and the inflamed glands can no longer be felt.

2. Cowper's Glands.

These glands are two in number, situated one on each side of the membranous urethra at base of the bulb. They are covered by the middle aponeurosis of the perineum.

They are about the size of a small hazel-nut, and consist of small lobules and acini. The acini are bunched together in the lobules and held in position by connective tissue. They are formed by a single layer of pyramidal cells, and their ducts join to form one duct, leading from each gland to the under surface of/
of/

of the bulb. This duct pierces the inferior layer of the middle aponeurosis and passing forwards enters the wall of the bulb and opens into the urethra at the anterior part of the floor of the bulb.

By means of the aerourethroscope these openings can be seen easily one on either side of the middle line, when the bulb is dilated by air. Otherwise they are difficult to see as they are covered by the folds of the mucous membrane.

Cowper's glands secrete a clear viscid fluid, which passes into the lumen during the process of ejaculation, and thus forms one of the elements of the spermatic fluid.

3. The Prostate.

The prostate has three lobes - a right and left - and an anterior or middle lobe. The whole gland is more or less conical in shape and is situated at the neck of the bladder, passing forwards as far as the middle aponeurosis.

The prostatic urethra passes through its substance, also the ejaculatory ducts. Its relations are, anteriorly the symphysis pubis, posteriorly the rectum, above is the bladder and below the middle perineal aponeurosis.

Structure./

Structure.

The prostate is made up of two distinct parts - an outer or connective tissue portion and a central or glandular part.

The outer surrounding portion of the prostate is made up of a mixture of connective tissue and unstripped muscle fibre.

The connective tissue sends in towards the centre a number of partitions which divide it up into a series of chambers in which the glandular portion lies.

These small glandules are made up of a dense connective tissue stroma lined by cylindrical epithelium which secretes a clear viscid fluid. This is only excreted during ejaculation and gives to the spermatic fluid its distinctive character.

The excretory ducts of these glandules pass inwards and open on the free surface of the urethra by small round openings readily seen by means of a magnifying glass.

THE PATHOLOGY OF GONORRHOEA.Gonococcus.

Gonorrhoea is the inflammation of the urethra caused by the Gonococcus.

This organism was first described by Neisser. It is always found in the form of a diplococcus, with a very uniform and distinctive shape.

Each pair is made up of two small ovoid halves, with short rounded ends, a convex or outer surface and a concave or inner surface. The two concave borders are always placed opposite one another with a slight space between, seen under the microscope as a thin strip of light.

The gonococcus is usually found in clumps, either in a pus cell (the typical Gonococcal cell), or it may be free (Extracellular). Sometimes only a few scattered pairs are seen. It is never found in chains. Always the two-and-two formation is present. Its length is 1μ and its breadth from $6 - .7\mu$.

It is easily stained with aniline dyes, e.g. methylene blue or gentian violet. It is gram-negative and this fact is a great help in difficult cases. It is important to make a constant study of its shape, its size, and its distribution. Although in most cases it/
it/

it is easily recognised, there are a good many slides in where there are gram-negative diplococci strongly resembling the characters of Neisser's coccus. But a careful examination reveals some difference. The characteristic bean-like outline is not clearly defined, or the two-and-two arrangement may not be present throughout the field, or some may be gram-negative and some gram-positive, or there may be chain formation in one or two parts of the field.

Acute Gonorrhoeal Urethritis.

The original seat of gonorrhoea is the mucous membrane of the urethra. It may spread by direct infection upwards to any part of the uro-genitary tract or through the blood to almost any serous membrane; also it may be directly transmitted to the conjunctiva, the mouth, or the rectum.

When first the gonococcus has entered the urethra it fixes itself on the surface of the epithelium and begins to multiply. This is the period of incubation; it lasts about thirty-six hours, during which time no symptoms are evident.

The gonococcus now commences to penetrate to the deeper tissues. It passes between the cylindrical cells and reaches the sub-endothelial connective tissue. An intense reaction is set up. The blood-vessels/

vessels are dilated, leucocytes pass out from the blood to attack the invading organisms. They absorb these in large numbers, but are in turn killed and carried to the surface in the blood serum and discharged from the urethra as pus, which usually appears about the third day.

The epithelium is destroyed and falls away leaving a raw surface.

As the process of inflammation develops, embryonic cells appear in the mucosa, forming a thickened, rough, inelastic surface which bleeds easily.

The inflammation may penetrate deeper than the mucous membrane and the connective tissue of the sub-mucosa becomes infiltrated with embryonic cells affecting also the structure of the corpora cavernosa.

This latter begins to swell and phlebitis supervenes, causing tenderness and intense pain during erection.

The lymphatics are usually affected and the glands swell and may go on to suppuration - gonococci being found in the pus.

The urethral glands may be implicated. Pus cells enter the ducts and directly infect the acini and also gonococci are found in the connective tissue around the glands. Together these attack the pyramidal epithelium which is killed and carried away and thus regeneration/

regeneration is possible. On the other hand the ducts may become blocked and pus collects in the glands and often goes on to form a cyst or even an abscess.

The denuded surface of the acini becomes the seat of an abundant cell proliferation, the duct walls thus become thickened and infiltrated with embryonic cells.

At the same time as the gonococcus is penetrating the deeper tissues, it is also spreading upwards along the surface of the urethra. From the fossa navicularis where it begins, it spreads backwards along the anterior urethra past the membranous sphincter into the posterior urethra.

If the inflammation merely penetrates as far as the membranous sphincter it is termed anterior urethritis, if it passes beyond this it is known as posterior urethritis. Posterior urethritis begins in from ten to fourteen days and is much more serious because it is then possible for so many complications to arise, e.g. prostatitis, vesiculitis epididymitis, cystitis, pyelonephritis, etc.

About the third week the acute stage begins to subside. The Gonococci are less numerous and the leucocytes are less active. The epithelium is gradually regenerated, the vascular changes are not so marked and the infiltrations of the connective tissue are reabsorbed. By the end of the fifth or sixth week the process of repair is more or less complete.

Pathology of Chronic Gonorrhoea.

Stratified squamous epithelium in many layers takes the place of the original cylindrical cells, and thus the surface is covered with a tough membrane almost impermeable to antiseptics. The elasticity of the membrane is less and altogether the possibility of cure is much diminished.

The submucous tissue is infiltrated with leucocytes and embryonic cells. By the proliferation of the embryonic cells much embryonic tissue is laid down. This is gradually changed into fibrous tissue - the seat of future stenosis and stricture.

At first there is dilatation of the blood vessels and capillaries, causing congestion of the mucous membrane. As the embryonic tissue is changed into fibrous tissue, contraction takes place and these become obliterated and atrophy.

By the contraction of the cicatricial tissue the mucous membrane is thrown into irregular folds and the regular longitudinal rugose formation of the urethra is lost.

The lacunae of Morgagni are also implicated. They swell up and their orifices are distended and easily distinguishable. Owing to the reabsorption of the embryonic infiltration they may retract, atrophy and disappear, or their mouths may become obstructed, giving/

giving rise to cysts filled with cellular debris. They may suppurate and form peri-urethral abscesses and fistulae.

Littre's glands are the ones most affected by the infiltration and various changes result:-

1. The infiltration of embryonic cells and leucocytes around the glands leads to a change in the epithelial lining of the ducts. It degenerates and peels off, and later a cell proliferation sets in, of the squamous type. The gland can now no longer secrete, and the acini soon become filled with epithelial debris.
2. The embryonic fibrous tissue may retract and thus choke the gland which becomes atrophied and disappears.
3. The glands may be shut off from the lumen of the urethra and thus cysts are formed. These may remain quiescent for a long time, but later may become acutely inflamed and suppurate.

The most careful treatment of these glands is necessary in all chronic cases, as again and again they are the means of reinfecting the urethra and of restarting a urethritis, which in every other respect has entirely cleared up.

In/

In the posterior urethra similar changes take place as those described in inflammation of the anterior urethra.

In the membranous portion, owing to the pressure of the sphincter, the mucosa is thrown into deep folds which form fissures, and these bleed easily once the epithelium is denuded. On the surface granulation tissue develops to a larger extent than elsewhere and thus bleeding is readily caused by instruments, and in many cases of posterior urethritis it occurs spontaneously at the end of micturition. This spontaneous bleeding is a typical sign of urethritis in the posterior urethra.

In the prostatic urethra the inflammation extends to the ducts of the prostatic gland, causing a mucopurulent or purulent catarrh. This may extend to the epithelium of the gland, giving rise to a purulent discharge, going on to abscess formation. Or on the other hand the epithelium may become atrophied and peel off, in which case there is a copious discharge of opaque white fluid containing much epithelial debris.

The ejaculatory ducts may be attacked. Their walls become thickened and sclerosed and thus gape, giving rise to spermatorrhoea. In conditions where there/

there is much narrowing of the ducts, great pain is experienced during the act of ejaculation, when the spermatic fluid is passing along the narrowed and rigid duct.

The ducts may become entirely closed, thus shutting off from the urethra the seminal vesicles, which form the seat of some of the most protracted cases of gonorrhoea.

Urethroscopy.

This term is applied to the direct visual examination of the urethra by the aid of the urethroscope.

In the Army there are still some medical officers, who are very averse to the use of the urethroscope, and it still seems necessary to put forward the many advantages of this instrument not only in aiding the diagnosis of the exact site of a lesion, but also in helping the treatment - medical or surgical - of that lesion.

In acute gonorrhoea the use of any instrument is distinctly contraindicated and the urethroscope at this stage of the disease is detrimental. But in the subacute, and especially the chronic stage, it is an invaluable aid, and many conditions could not be accurately known or treated without it.

I was most impressed with the value of the urethroscope in a case of a soldier who had suffered from Gonorrhoea for eighteen months. He must have passed through many hands.

When examining him with the endoscope, the first thing which one saw was a much eroded verumontanum, and pus oozing up from the left side of it. The rest of the urethra was fairly normal, except for one or two chronic follicles. At the last inch or two of the/

the urethra however, I was able to discover three large papillomata, the source of much irritation and annoyance.

Three points are of especial importance concerning that case:-

1. As the usual prostatic examination had shown the prostate to be healthy, it was difficult to understand from whence the pus cells in the constant discharge were coming. The examination at once localised it to the prostatic glandules around the base of the verumontanum.
2. Had the former condition been removed, a morning drop would have been the continued evidence of further trouble, the true nature of which, after more than a year, was alone revealed by the endoscope.
3. It was only by using the urethroscope that both these conditions could be efficiently cauterised and cured.

To me it almost seems unnecessary to say that I have not once experienced any ill effects (e.g. epididymitis, cystitis, etc.) from the use of this instrument, and against the discomfort to the patient of its manipulation, is the fact that they much preferred it to/

to any other instrumentation, and greatly appreciated the rapidity with which their long-standing troubles vanished after it had been used only once or twice.

Another important use of the urethroscope is that it enables one to follow and control any course of treatment carried out in the urethra. For instance one may follow the improvement taking place during a course of dilatation and can see directly that the urethral wall is being dilated and not torn, and can also see, in the case of a tear, that healing has taken place before again commencing the dilatation.

Lastly, the urethroscope is a great help in prognosis, and in the matter of ascertaining whether a patient is properly cured. The gonococcus may lie dormant in a follicle for a long time, a patch of submucous infiltration may give rise to no appreciable symptoms or signs, but a careful examination of such a case would prevent one from making a mistake in the prognosis and thus being the cause of disappointment to the patient, a point so important in treating persons suffering from gonorrhoea.

Urethroscopes.

There are several urethroscopes on the market and these are of two types:-

1. Those with external reflected illumination.
 2. Those with internal direct illumination.
-
1. The Wyndham Powell aero-urethroscope is perhaps the commonest variety of this type. Fenwick's aero-urethroscope is somewhat similar, and can be had with a magnifying eye-piece. The one I used for some months had no such eye-piece and this is a great disadvantage.
 2. Of the internally illuminated urethroscopes Luy's pattern is much the simplest and most easily handled, because of its lightness and the intensity of its illumination, and the ease with which this can be procured. No focussing of reflectors is required, and once the lamp is in position any movement on the part of the operator does not interfere with the illumination.

Campbell has modified this pattern to allow of the use of inflation by air and his aero-urethroscope to my mind is much easier to work, allows of a far brighter, clearer, visibility, and does not require such a powerful voltage to procure the necessary light as those of Wyndham Powell/

Powell or Fenwick. The light from these internal lamps being directly on the spot forms a much brighter and clearer picture than it is possible to secure with external illumination.

In the latter method, in order to project the light into the urethroscopic tube, one or two mirrors or reflectors are required, and the necessary screws, etc. for their adjustment. These add considerably to the weight of the handle and thus to the difficulty of intra-urethral manipulations. As long as one is merely examining the urethral mucosa and has the use of both hands, not much difficulty is experienced, but as soon as the surgeon wishes to use a swab or probe with the right hand, the whole weight of the instrument must be supported with the left hand, which at the same time is holding the penis and fixing the tube in its required position. This is difficult enough when examining the bulb, but the nearer one approaches to the meatus, the more apt is the tube to slip out altogether.

In this position the surgeon can grasp merely the distal end of the tube, and thus it is all the more difficult to support the weight of the handle.

I do not know if it comes into the scope of a thesis to give a description of the instrument one has used. If this is not necessary the next few paragraphs may be passed over.

CAMPBELL'S AERO-URETHROSCOPE.

This consists of three parts:-

1. The tubes with their corresponding pilots.
2. The electric bulbs or carriers.
3. The Eye-piece with its electric adjustment and magnifying lenses.

1. The Tubes.

These are made of electro-plate and consist of a nearly cylindrical body and two extremities.

The distal or internal end is nicely rounded off and shows a slight bevel allowing a freer exit to the light from the lamp, which is fixed along the lower, projecting surface. Along this surface runs a groove which admits of the lamp with its carrier and thus these interfere very little with the field of vision.

The external or proximal end of the tube has a small peg and a notch, which fit accurately to the handle by means of a corresponding socket and peg.

The tubes are of two lengths - 13 cm. and 7 cm. The one of 13 cm. I find much the most useful as with it I can see right to the farthest end of the prostatic urethra and can easily use the same length for operations in the fossa navicularis.

It is best to have 2 or 3 tubes of different calibres. A 24 and a 26 Charrière are usually supplied/

supplied and meet most requirements, but I ordered and used a 22 for the few cases which one could not dilate to 24. In one or two cases smaller than this I have done meatotomy with great advantage.

The larger the calibre the better the view, and the easier the manipulation of instruments within its lumen.

The pilots are circular and fit into the tubes. Their rounded ends project slightly beyond the distal extremity and are easily withdrawn, as the groove for the lamp allows air to pass freely, and the mucous membrane is not sucked into the tube.

2. The lights.

These consist of minute bulbs fixed on the end of a hollow metal rod which contains the electric wires suitably insulated. These rods vary in length to correspond with the tube used.

The proximal end of this rod screws into a socket on the eye-piece to which the electric wires from the battery are attached.

When the handle is in position the lamp and its carrier lie along the groove on the lower surface of the tube.

The strongest objection to the use of internal illumination is the delicacy of these lamps. But if used/

used with a small battery where the power is not sufficient to fuse them, one lamp will last for many months. For this purpose a dry cell battery of 4 volts with a small rheostat attached to the top answers the purpose splendidly, and may be carried easily anywhere. This of course is particularly useful to anyone like myself, who has to work in isolated parts of our colonies, away from all source of modern electrical appliances.

3. The Eye-piece.

This consists of a cylindrical tube rather more than twice the diameter of a 26 tube. The distal end fixes on to the tube as described above. On the lower surface inside is the screw socket that holds the lamp carrier.

The base of this socket is connected through to the outside by two fixed rods to which the electrical connections from the battery can be adjusted by means of spring catches.

When in position these rods form an excellent light handle by means of which the whole urethroscope can be fixed and held in position by the thumb and first finger of the left hand.

There is no electrical interrupter but the current can be turned off by using the rheostat or merely slipping off the spring catch at the end of one of the wires.

At the right hand side of this tube is fixed a small pipe and stopcock to which can be attached a rubber tube and bellows when an aeroscopic effect is required.

The proximal end of this eye-piece is closed by a flanged metal ring, in which is fixed a lens of focal length, corresponding to the length of the tube in use. Thus there are two of these and on each is scratched its corresponding number - 13 or 7. To one side of the centre of each lens is a circular hole which is partly closed by a rubber stopper. This stopper is perforated in the centre for the passage of an instrument which cuts off all connection with the outside atmosphere and operations may be done while maintaining the aeroscopic effect.

During an examination this perforation is closed by a small metal plug supplied for this purpose.

Technique of Urethroscopy.

Instruments.

The best form of table is one the top of which can be adjusted to form a kind of reclining couch, furnished at one end with foot-rests in order to support the patient in the usual lithotomy position.

It is always useful to test the lamp and battery before bringing in a patient, otherwise much valuable time/

time is lost. The lamp should burn with a bright white light else the illumination will not be sufficient and the examination unsatisfactory.

The urethroscopic tubes and their pilots are sterilised by boiling and laid out in a flat dish in warm boracic lotion (1 in 60).

The best lubricant is lubafax, made and sold in 1/- tubes by Burroughs Wellcome & Co. Or glycerine made into a thin jelly with tragacanth, to which is added 1% Oxicyanide of Mercury. Each time a little is poured into an aseptic glass from the stock bottle.

The lamps are best sterilised in alcohol and laid on a sterile towel on the table at the operator's left hand.

At the operator's right hand should be a small table covered with a sterile towel and on this can be laid the sterile swabs wound on both ends of small cane holders, two or three urethroscopic probes on to which is fused silver nitrate, a pair of urethroscopic forceps, and a urethroscopic curette.

The patient removed all lower garments except socks or stockings. He reclines back in a slightly elevated posture with the buttocks resting at the very edge of the table, and the feet supported on the foot-rests. The glans penis is carefully cleansed with an antiseptic - 1 in 2000 corrosive sublimate or methylated spirits.

Contraindications/

Contraindications:-

Acute inflammation as evidenced by pain on micturition or during erection, and by a hazy urine due to pus.

Also any acute inflammatory complication, e.g. acute epididymitis or prostatitis.

Note.

Before any urethroscopic examination can be carried out it is always absolutely essential to pass a sound at a previous sitting and ascertain the calibre of the urethra throughout its whole length.

The meatus is normally the narrowest part, and the best results in urethroscopy are obtained if the urethra is dilated as far as the meatal orifice will permit.

See that the patient does not irrigate on that day or pass water 4 - 6 hours before the examination, else all secretions are removed, and irrigation with permanganate of Potash coats the mucous lining with a brown sediment and the true condition of the membrane is obliterated.

I have had one or two patients who were peculiarly sensitive and nervous, and in these it is advisable to use an injection of alypin (2%), 1 dram injected a few minutes before operating causes complete anaesthesia, and does not blanch the mucous membrane as stovaine does.

Operative Technic:-

Select the special size of tube required, say a 26 (Charriere) 13 cm. long and a corresponding lamp is screwed into the eye-piece. The tube, with its pilot in position, is lubricated, and the surgeon, standing between the patient's legs, introduces it vertically into the urethra as far as the membranous sphincter. The triangular ligament now holds it from further progress. Gradually lower the proximal end of the tube, while maintaining it in position with the gentlest pressure, and as soon as the tube becomes horizontal or nearly so, it will slip forward into the posterior urethra, and on into the bladder. One learns this by the feeling of easy movement produced and the flow of urine along the tube. Withdraw the tube a little until its point is in the prostatic urethra and remove the pilot. By doing this latter movement slowly and carefully one soon finds that he can remove the pilot without any discomfort to the patient. A quick or jerky movement tends to draw the mucous membrane into the bottom of the tube.

By placing the left hand over the pubic region and pressing downwards the integuments, the perineal ligament is slackened and the passage of the tube into the/

the posterior urethra is greatly facilitated.

With these precautions bleeding and discomfort are greatly reduced.

The assistant now hands a mounted swab and all urine and superabundant lubricant are removed with any blood that may be present. The eye-piece with lamp in position is now introduced and the lens adjusted. Now turn the tube to the right through half a circle, the lamp will then come to lie at the top and cannot now be soiled with any secretions. Also the fullest light is thrown on the floor of the posterior urethra - the principal part to be examined at this point.

Inspection of all the different parts of the urethra may now be obtained and if one wishes, (by blowing the bellows and turning the stop-cock) air may be admitted and the mucous membrane examined minutely in every part. A great advantage of the aeroscope is that any tendency to bleeding is now banished and the picture is now clear. Any swabbing or cauterisation may be done under the direct control of the eye as it is not necessary to remove the lamp and the light thus present enables one to reach the exact spot required.

URETHROSCOPY OF THE
NORMAL AND PATHOLOGICAL URETHRA.

Urethroscopic Examination of the normal urethra.

To gain a correct idea of the value of pathological pictures procured by the urethroscope one must have an accurate knowledge of the normal aspect of the urethra.

In a military venereal hospital, where both syphilitic and gonorrhoeal patients are admitted, this is particularly easy to obtain, and a medical officer has the advantage of examining a number of normal urethras in patients undergoing syphilitic treatment.

There are certain conditions common to all parts of the urethra and it would be well to mention these before taking up each part separately.

The mucous membrane is thicker and firmer in healthy persons with well developed genitals than in those in whom they are small.

The colour varies from greyish pink to a blood red. The colour also is influenced by the size of tube used, as pressure produces constriction of the vessels and thus a large tube causes a paler condition than a small one. Or if one presses against the wall of the urethra with the point of the tube a localised/

localised paleness is produced at that spot, and one is apt to be misled at first. By moving the tube round from side to side the best view is procured of each wall and the changes produced by pressure, etc. are easily noted.

Each picture is usually described as the "central figure" and the mucous membrane proper. The "central figure" is the canal of the urethra.

Normally the walls are in apposition except during the passage of urine; and when a tube is introduced the walls can be seen to separate at the point of the tube and thus a funnel is formed. This funnel may be obliterated and the mucous membrane made to bulge into the tube by pressing the tube inwards. This is useful if a follicle or any particular area requires to be examined carefully. On the other hand by pulling on the tube and penis simultaneously the funnel is lengthened, a long expanse of urethra is seen at one time, and follicles, etc. may be seen in profile if they are abnormal and project into the lumen of the urethra.

Also any particular spot on the wall of the urethra may be brought into good view by inclining the tube to that particular side.

The surface of the mucous membrane is thrown into a series of folds or rugae, giving the appearance of a wheel, the hub of which is formed by the "Central figure."

These rapidly disappear under pressure from the tube or by aereal dilatation, and are thus best seen when using a tube of small calibre. In the bulbous region this striation is particularly well marked where the surface of the fold is bright red, gradually tapering off into a pale yellow rose colour.

The surface of the mucous membrane is smooth and glistening, but becomes dull and roughened under pathological conditions.

Urethroscopic Examination of Posterior Urethra.

With great care introduce the tube into the posterior urethra, and very gently dry the mucous membrane with a mounted swab, as bleeding is so easily caused in this region. When the lamp is in position and turned on a very characteristic picture is seen. It is like a triangle or fan. The apex of the Δ is formed by the neck of the bladder which shows a series of closely placed folds which pass forwards gradually diverging to form the base of the Δ which lies in a small hollow - the prostatic fossette. It lies immediately anterior to the prostatic gland.

This space is sometimes the unsuspected seat of chronic inflammation and this can only be examined and diagnosed by the use of the urethroscope.

Verumontanum.

By drawing the tube very slowly forwards the verumontanum is brought into view. It is sometimes spindle shaped, or it may form a projection which bulges at the apex and looks very much like a miniature diver's helmet.

It is bright red in colour with a smooth shining surface. It is about the size of a split pea and tapers off in front and behind. At its apex is seen the utriculus - a small opening or cleft into which open the ejaculatory ducts. Sometimes this is not visible at all and at others there is no central slit, but two lateral ones, which are the ejaculatory ducts opening directly into the lumen of the urethra.

Examination of the verumontanum is important because of its very close relation to the seminal vesicles and a diseased condition of these is invariably reflected in the verumontanum.

Above and surrounding the verumontanum on either side is the anterior wall of the urethra thrown into many folds and forming a kind of bolster, which fits closely the projecting surface of this organ.

Anteriorly the verumontanum tapers off to form a narrow fraenum which flattens out into the wall of the membranous urethra.

The/

The membranous urethra is characterised by a pointed central figure with the folds of mucous membrane radiating outwards in a symmetrical fashion similar to that found in the pendulous portion of the penile urethra. It is smaller and of a blood red colour, and is the part that bleeds most readily. As one pulls out the tube farther, one must raise the proximal end and eye-piece, else the lower end, weighed down by pressure from the triangular ligament, will leave the membranous sphincter with a jerk and hurt the patient.

Once the examination of the verumontanum is finished, begin to raise the eye-piece until the tube is practically in a vertical position. One is now looking at the bulbous region.

Anterior Urethra.

In the bulbous urethra the central figure forms a vertical slit. The longitudinal striation is very well marked because of the bloodvessels running in a longitudinal manner along the surface of the folds. If the aeroscope is employed here, the whole cavity becomes dilated and pale in colour. If the dilatation is not pushed to its fullest extent, the circular muscle fibres remain bulging into the lumen and these rings look very much like strictures unless one is warned/

warned beforehand. Further dilatation dispels these and makes the wall smooth, revealing the characteristic bulbous shape of this region.

On the floor of the bulb - $\frac{1}{4}$ inch anterior to the membranous sphincter - can be seen the two orifices of Cowper's glands, placed one on either side of the median line. Unless dilatation by air is employed one may not be able to see these at all as they are usually hidden in the folds of the mucous membrane.

As the tube is drawn farther out, the central figure changes to a point placed centrally, from which radiate the folds like the spokes of a wheel. The tube is now in the penile portion of the anterior urethra. It is of a yellowish rose or pinkish colour. One may easily see Morgagni's lacunae as V folds or valves placed on the median line of the anterior wall. One cannot see the openings of Littre's glands except after disease, when they are enlarged and seen as minute depressions in the mucous membrane.

In the fossa navicularis the central figure is an oval and the surface is smooth and not thrown into folds. It is of a greyish pink colour, and apart from the lacuna magna or Valve of Guerin, is void of any glands.

Urethroscopic Examination of the Pathological
Conditions of Posterior Urethra.

Very often the examination of the posterior urethra is omitted altogether and medical officers confine themselves to an examination of only the anterior urethra.

By examining every case from the neck of the bladder forwards, it enabled one to become familiar with the appearances of each region and the continual practice made the passing of the tube easy.

I have examined cases where there was little or no evidence of prostatic trouble revealed by rectal examination, and yet the posterior urethra was eroded and granular and purulent discharge was seen oozing around the base of the verumontanum.

By means of the urethroscope alone can these conditions be accurately diagnosed and through this instrument direct application of silver nitrate or iodine or the galvanic cautery can be made.

Soft Infiltration.

Soft infiltration is the commonest form of lesion.

The mucous membrane is hyperaemic, swollen, and bleeds easily. In an advanced condition this comes to look like haemorrhoids. The usual folds are obliterated/

obliterated and a few large swollen raspberry-looking projections of a dark red hue are seen.

The verumontanum may be much enlarged, dark purplish-red in colour, and bleeds easily.

A course of dilatation first with curved sounds up to 22 - 26 followed by Kollmann's posterior dilator up to 40 Charriere will result in a cure. Sometimes it is necessary, especially where there is mixed infection and a large number of pus cells in the smears, to inject silver nitrate, beginning at 2% and working gradually up to 10%. This injection should be given once a week.

I have had no experience of stricture of the posterior urethra which must occur in the neglected cases of soft infiltration described above.

Polypi are also found growing out from the verumontanum or the membranous urethra, but these are rare in comparison with their occurrence in the anterior urethra, several of which I have had the privilege of discovering and treating.

Hypertrophied Verumontanum.

This condition can only be revealed by use of the urethroscope. It results from long standing inflammation aggravated and kept up by masturbation. Cauterisation through the urethroscope and forcefully impressing the patient of the serious consequences of his actions will do a great deal towards restoring it to its natural condition.

URETHROSCOPIC EXAMINATION OF THE PATHOLOGICAL
CONDITIONS IN THE ANTERIOR URETHRA.

1. Sub-Acute Urethritis.

At the end of a fortnight to three weeks almost all cases of gonorrhoea have cleared up. The discharge has ceased, or is confined to a morning drop, the urine is clear with only a few threads in the first glass, or there may be none in either.

The passage of sounds is now begun and as soon as 24 or 26 Charriere is reached the urethroscope may be used. A small area of hyperaemia may be seen, and in this one or two congested follicles. Dry the mucous surface well and by means of the silvered probe destroy these glands. After a week's further irrigation a second examination will show that all inflammation has gone and the glands are hardly visible.

In this way the subacute stage is greatly shortened and the chance of relapse very much diminished.

2. Chronic Urethritis.

Soft infiltration is the most frequent result of chronic urethritis of the anterior urethra. By means of the urethroscope a series of very definite pictures can be made out according to the particular site or origin of the lesion.

Bulbous Urethra.

Here a very characteristic appearance is seen. Instead of the smooth orange red mucosa with its well marked vascular striations and clearly defined rugae, the folds have lost their regular arrangement, the mucous membrane is changed to a dull red colour, and the surface is roughened and covered with minute points of granulation tissue giving it a marked granular appearance.

In advanced stages of soft infiltration the mucous membrane looks swollen and turgid. Instead of the numerous small, regular folds, the mucous membrane bulges into the lumen in a few large, cherry-like projections, which obliterate the normal central figure. If the part is now inflated it will be found that the walls do not dilate as normally, but that they bulge into the lumen of the canal and are red and swollen and oedematous.

If untreated by super-dilatation with Kollmann's dilator, such a condition will give rise to a more or less purulent discharge for many months and even for years, and eventually become the site of a fibrous stricture.

Penile/

Penile Urethra.

The commonest sites to find soft infiltration in the penile urethra are at the middle of the pendulous portion, or at the peno-scrotal angle, or it may be at both of these in one and the same case.

In these regions the granular appearance is not so marked. The surface is dull red in colour, the usual arrangement of the folds is lost, and the mucous surface is changed into dull red projections, which look flabby and bleed easily. In these regions there are many inflamed follicles which show up as minute pin-head dots projecting towards the lumen of the urethra and enclosing a small depression or central aperture, the orifice of the gland.

These glands are often clearly defined by an area of congestion around them, and stand out as minute blood red circles dotted here and there in the field of vision, but mostly in the median line of the anterior wall, where sometimes I have seen an almost continuous row of them. Sometimes a small purulent bead may be seen to exude from the mouth of these glands.

A peculiar feature of submucous infiltration is that it is distinctly local in its effect. An area of inflammation may be seen at the peno-scrotal angle - affecting only one wall of the canal - then a space of healthy mucous membrane, and as one draws the tube farther/

farther out two or three infected areas may be noticed, with healthy tissue between them.

Thus also a batch of glands may be discovered at one site, and a few others at a distant spot.

Papillomata are said to accompany soft infiltration. I have only seen two cases of these.

One, a young soldier sent home from France because of a chronic gleet that could not be cured. Irrigations were recommended and the urine was found to be quite clear. The prostate was examined and found normal. Sounds were passed up to 22 - 26 Charriere. No obstruction was felt and nothing could be palpated externally.

I examined him with the urethroscope and found the posterior urethra healthy, but just outside the membranous sphincter at the base of the bulb was a small pedunculated papilloma. I curetted this and cauterised the base with pure silver nitrate. After a few days' further irrigation he reported that he was "dry" the first time for some months. When examined later no trace of the tumour could be seen, nor was further trouble experienced.

The other was a soldier of 36 years of age. He had been in and out of hospital with repeated relapses. After eighteen months I was asked to see him, and discovered besides posterior trouble and some chronically/

chronically inflamed follicles, that there were three large warts. Two of these near the fossa navicularis were pedunculated, cauliflower-like growths, and the third about an inch farther in was more sessile and more like a papilloma. It was not until the man had been urethroscoped that the condition and the extent of it was realised. In his case there was much nervous trouble and depression, thus it was important to have an accurate diagnosis and proper radical treatment.

Hard Infiltration.

This condition is commonly known as stricture and is the result of neglect or bad treatment of soft infiltration.

The colour is changed to greyish yellow or in marked cases to greyish white.

I like Kidd's classification of strictures, because in his description of four types he arranges them according to the degree of infiltration causing them, and each type is represented by a definite picture as seen by the urethroscope.

1. Commencing Crescent Stricture.
2. Bridle Stricture.
3. Diaphragm Stricture.
4. Tunnel Stricture.

1. The commencing crescent stricture is seen as a small fibrous band forming a crescent across about a quarter of the lumen of the canal. In the centre of this is seen the open mouth of a follicle. Such a stricture is the result of longstanding inflammation around one of Littre's glands.
2. In this type the fibrous band is larger, passing across a half or two-thirds of the canal. This is caused as the ultimate result of soft infiltration attacking a portion of one wall of the urethra.
3. This is seen as a complete fibrous circle across the canal with a small patent opening in the centre, and is caused by the infiltration involving locally the entire circumference of the canal.
4. The tunnel type is due to an extensive soft infiltration. One is able to see the dense white fibrous tissue surrounding the whole circumference of the canal, and through the small opening may be seen the firm, patent canal beneath. Usually the opening is a mere pin point and nothing can be seen until dilatation has been commenced, then as one introduces and withdraws the tube through this dilated aperture, the walls remain gaping and the face of the stricture is clearly seen.

In/

In examining the first two types of stricture by the use of the aeroscope one can easily discover the extent of the wall involved, as dilatation does not take place where there is any hard infiltration. In the third and fourth types the lumen of the canal withstands all efforts of inflation, but once dilatation has been commenced, its progress can be followed from step to step until a complete cure has been affected.

Glandular Lesions.

Glandular lesions may be seen in conjunction with sub-mucous infiltration or they may remain infected after the infiltration has cleared up.

These are of two kinds:-

1. Glandular, where the orifice remains patent and is defined by an area of congestion. It may stand out as a small red pin-head nodule projecting into the lumen of the canal.

2. Cystic, where the orifice is cut off by contraction of the fibrous tissue of the infiltration, and the gland is cut off from the urethra. A small thin walled cyst may result or nothing may be seen at all.

Many such cases came under our notice, as large convoys of chronic cases were sent to us from France. The enlarged follicles could be clearly felt on palpation/

palpation over a bougie, but if the particular spot were examined no trace of the gland orifice could be found.

I treated these cases with regular massage over a straight bougie combined with dilatation by Kollmann's dilator. Later urethroscopic examination revealed these orifices now opened and the process of cure could be very much shortened by cauterisation with the silvered probe.

These cases were most persistent and required massage bi-weekly over a prolonged period coupled with cauterisation through the urethroscope every two or three weeks. So chronic had a few of these become by the time they came to us that three or even four months longer were necessary to thoroughly obliterate all trace of disease.

The only symptom was persistent morning drop. The clinical signs were many pus cells in the smear, few or no gonococci, and more or less tenderness during massage.

Some were so large, especially those showing a tendency to suppuration, that the urethroscope could not be introduced past them, and dilatation was painful. By introducing the urethroscope down to the swelling the follicle could be opened by means of a urethrotome. This was followed by irrigation and massage and soon the passage of a bougie became easy.

A Test of Cure.

As a test of cure too much emphasis cannot be laid on the evidence obtained by urethroscopic examination.

Especially is this the case in military hospital practice, where the technic of routine examination is largely carried out by orderlies, where deception on the part of many patients is developed to a fine art, and where of necessity the period of convalescence is much shorter than in private, - a patient once discharged is seldom if ever seen again. Cases were marked up for discharge from hospital as cured, because no discharge was present, the slide was negative or could not be obtained, and the prostate was normal.

Direct visual examination of the urethra would reveal a small area of sub-mucous infiltration or a quiescent chronically inflamed gland, and if untreated a relapse was certain to follow.

As Medical Officer in charge of the Gonorrhoea Division of a Venereal Hospital, I found the urethroscope invaluable in several doubtful cases, and was able not only to return patients for further treatment, but also to state exactly what treatment would be required.

Marriage.

When one is called upon to give a definite opinion as to the time when a gonorrhea patient may marry, great confidence is bestowed in giving such, if a thorough examination by the urethroscope has been made of the entire urethral canal. This combined with bacteriological and complement deviation tests allows one to state absolutely, whether or not such a patient is fit to marry.

C O N C L U S I O N S .

Diagnosis.

1. In diagnosis the urethroscope is absolutely essential in a large number of cases of chronic urethritis, e.g. soft infiltration, folliculitis, papillomata, etc.

2. The Urethroscope, although not essential, is a great aid to the accurate diagnosis of the site of a lesion in all cases of chronic urethritis, and much time may be saved by knowing the exact spot to treat.

Treatment.

(1) Most cases of acute Gonorrhoea may be completely cured without the use of the urethroscope, but by early urethroscopic examination and by cauterising any glandular lesion still present, the chance of relapse (so often caused by the rupture of a follicle) may be avoided, and thus the sub-acute stage may be much shortened and the chronic stage often prevented.

2. Chronic Urethritis.

The urethroscope alone enables one to apply local treatment to the actual part involved, and by a later examination to estimate accurately the exact result obtained.

This/

This is exemplified in such conditions as papillomata, chronic folliculitis and inflammatory conditions of the verumontanum, etc. These could not be treated without the aid of the urethroscope.

3. Urethrotomy.

In advanced cases of stricture requiring urethrotomy, the advantage of the urethroscopic method over that of the old, blind operation of internal urethrotomy is very great.

By using the urethroscope one can gauge accurately what is required, and can see clearly how to do it.

This operation does away almost entirely with the need for external urethrotomy - an operation fraught with so many difficulties in nursing and after-treatment, and in many cases requiring secondary plastic operations to complete the cure.

4. As a means of Control.

During a course of dilatation either in soft or hard infiltration, the process may be directly controlled by occasional urethroscopic examinations.

The extent of a tear may be carefully outlined and the state of repair may be noted by direct visual inspection.

Prognosis./

Prognosis.

As a test of cure the evidence, gathered from an examination with the urethroscope, is invaluable and renders very accurate one's opinion of the condition of the urethra. No opinion as to marriage can be reliable if such an examination has not been made by a competent expert.

S U P P L E M E N T.

In the treatment of spermatocystitis and of chronic hypertrophy of the prostate, an important field has recently been opened up by the improvement in the technic of endoscopy and by the increased knowledge which has developed with the fuller use of the urethroscope.

Both these conditions may be attacked through the urethra and thus in many instances save the necessity of a serious operation through an external route.

Chronic vesiculitis can be treated by catheterisation of the ejaculatory ducts, and chronic hypertrophy of the prostate by cauterisation of that organ per urethram.

As I have neither had the instruments nor the opportunity to carry out these operations myself, I have considered it better to give a resumé of them in a supplement rather than to embody them in the thesis proper. They are so important and are such splendid achievements of modern urethroscopy, that one cannot deal justly with that subject and leave them out.

Catheterisation/

CATHETERISATION OF THE EJACULATORY DUCTS.

Indications.

This operation is indicated in all cases of chronic spermatocystitis where there is difficulty in emptying the vesicles by massage, or where there is any derangement in the function of seminal ejaculation.

Diagnosis.

Disease of the seminal vesicles is very often overlooked because the symptoms are generally slight and may not be directly associated with the organs in question. But there are four distinct signs, which, if all are present, create a clear picture of the actual disease.

1. Tenderness is experienced on palpation through the rectum.
2. Thickening and hardness of the vesicular walls.
3. Pain in the region of the verumontanum on the passage of an olivary bougie. This is due to inflammation of the verumontanum, which is invariably associated with disease of the vesicles.
4. Massage of the seminal vesicles may produce more or less complete casts of the organs.

Associated with these signs are some indefinite symptoms, e.g. pain on micturition, a hazy or clear urine with shreds in the first glass, or may be in both glasses, indefinite pains referred to the perineum, testicles or even kidneys. Sometimes ejaculation may be painful or there may be sexual weakness or impotence, or the seminal fluid may be discoloured by blood or pus. All these symptoms give rise to general weakness and neurasthenic tendencies which can only be removed by recognising and treating the proper source of the trouble.

TREATMENT OF CHRONIC VESICULITIS.

This has mostly been carried out by one of three operations:-

1. Vasotomy - opening into the vas deferens and injecting antiseptic lotions into the vesicles.
2. Vesiculotomy - opening into and draining the vesicle through the skin, etc.
3. Excision of the Vesicle.

These are difficult and serious operations and in most cases can be avoided by dilatation of the ejaculatory ducts by the aid of the urethroscope, followed by careful and thorough massage of the vesicles through the rectum.

Contraindications.

Catheterisation of the Ejaculatory ducts must not be attempted during any acute inflammation of the urethra or of the prostate or of the seminal vesicles. Further, this operation should not be begun until all inflammatory condition of the posterior urethra, especially around the verumontanum, has been thoroughly treated by cauterisation and dilatation.

Technic of the Operation.

Having previously taken all necessary steps for preparation of the urethra before proceeding to catheterisation of the Ejaculatory ducts, the surgeon gives the patient a thorough urethro-vesical irrigation. The medium tube - 13 cms. - is chosen, of the largest calibre possible, according to the previous dilatation of the urethra. Introduce the urethroscope as far as the prostatic fossette and gradually withdraw the tube until the best view is gained of the upper surface of the verumontanum and the utriculus.

One or two pictures is usually seen.

Either the utriculus alone is seen, and into the lips of this open the ducts one on either side, or the utricle is in the centre, and an ejaculatory duct opens one on either side of it.

Introduce the urethroscopic sound and proceed to/
to/

to catheterise the ducts.

In the latter case this is easier as the orifices are apparent. The sound is passed horizontally along the floor of the urethroscope and by a series of verticle and horizontal manipulations is introduced into the orifice of the duct. Very gently and without any material force it is gradually passed deeper. If any resistance is encountered the movement must be stopped. Having passed the first stylet, a second of larger calibre may be tried and so on up to the largest size, always avoiding undue force and the causing of haemorrhage of the mucosa.

Where the ejaculatory ducts open into the utricule the sound is passed directly into this and by tilting the stylet to one or other side, and manipulating it as before, the orifice of the duct will be found and entered.

RESULTS ACHIEVED BY CATHETERIZATION OF THE EJACULATORY DUCT.

The results of this operation may best be shown by quoting one of Luy's cases which he treated in this way.

"The patient had had three attacks of gonorrhoea, almost all of them being accompanied by various complications/

complications which included prostatitis and orchitis. He had an abundant discharge which contained gonococci. His urine was uniformly turbid in all four glasses. Examination showed the existence of a very clear-cut case of chronic prostatitis; the epididymes presented hard indurations; the seminal vesicles, especially the left, were painful to the touch."

"Treatment consisted at first of thorough urethrovesical irrigations with permanganate combined with massage of the prostate and the seminal vesicles. Dilatation of the urethral canal was then instituted at first with curved sounds, later with Franck's dilator."

"Nevertheless, the left vesicle was still painful. In addition the highly important fact was noted, that the contents of the left vesicle could not be evacuated by massage, even when vigorous enough to cause severe pain. One day an attack of epididymitis in the left testicle was provoked by a massage, no instrument that might have accounted for it having been introduced into the urethra. Though the attack kept him in bed three or four days, the reaction was slight and the inflammation yielded to treatment quite readily. This occurrence, combined with the above noted observation, clearly demonstrated that massage was not emptying the seminal vesicle, and that in consequence/

consequence the ejaculatory canal was undoubtedly choked up with the debris. In these circumstances it was but natural that an attempt be made to re-establish a free lumen in the duct."

"After all evidence of inflammation in the canal had disappeared, I made a urethroscopic examination with a tube No.26 calibre. The verumontanum was easily visible, and because of the antecedent local treatment there was no inflammation or bleeding."

"The orifices of the ejaculatory ducts were found on the lateral sides of the verumontanum. On the left side, the orifice of the corresponding duct presented itself clearly, and I tried to catheterise it with a fine urethral sound No.5; but the tip of the stylet immediately slipped on the swollen and smooth surface of the verumontanum and refused to enter the interior. I then took a metal stylet with a studded tip and I noted that its end penetrated the orifice of the duct with the greatest facility. The tip, being slightly conical, was at first arrested somewhat, but it soon entered the lumen of the duct for a distance of about one and a half centimetres."

"Immediately after this catheterization, the bladder was filled with oxycyanide solution and the left seminal vesicle massaged. To my great surprise and gratification, I found that massage hardly produced/

considers the awful wasting and complete invalidism of patients suffering from gonorrhoeal arthritis, (so often associated with vesicular trouble) one welcomes this new method of treatment with keen interest and anticipation.

ENDOURETHRAL TREATMENT OF PROSTATIC HYPERTROPHY.

According to Luys endourethral treatment by means of the cautery, is indicated rather than transvesical prostatectomy in the following circumstances.-

1. Incomplete retention of clear urine, varying from 50 to 200 c.c.
2. Increased frequency of micturition.
3. Pain at the beginning and end, of micturition.
4. Diminution in power of stream.

If these cases are examined by the urethroscope, the tube is stopped in the posterior urethra by the bulging into it of the hypertrophied prostate. This point of resistance is produced at the level of the prostatic fossette, just behind the verumontanum and before one reaches the neck of the bladder.

The essential of the operation consists in passing into the bladder the long, straight cystoscopic tube, 18 c.m. This is guided past the obstruction by/

by its obturator, the elbowed portion of which projects 3 c.ms. beyond the distal end of the tube.

The obturator is withdrawn and all urine and secretions and blood are removed from the bladder. The lamp is attached and the base of the bladder is examined, and the two lobes of the prostate are made out.

As the tube is withdrawn one can then see the prostatic eminence beginning at the neck of the bladder.

A few drops of stovaine are placed on this, and after anaesthesia is established a groove is cut in the prostatic eminence by means of the galvano-cautery.

This can only be done gradually and after several sittings, say once a week. The operation is complete when a straight urethroscopic tube can be passed easily into the bladder and no residual urine is left.

It is claimed for this operation that all residual urine disappears, the force of the urinal stream is increased, frequency and difficulty of micturition are greatly diminished, and all pain in connection with micturition is lost.